

THE LECTOTYPE OF THE AMMONITE *CADOMITES PSILACANTHUS* (WERMBTER)

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ABSTRACT. The inflated '*Am. humphriesianus*' d'Orbigny (1845, pl. 134, figs. 1-4), *non* J. Sowerby (1825), has subsequently been named three times; the oldest objective synonym is *Stephanoceras psilacanthus* Wermbter (1891). The lectotype has been found in the British Museum (Natural History) and is redescribed. It probably came from the boundary Humphriesianum-Subfurcatum Zones at Sully, near Bayeux, Normandy. Specimens from the Parkinsoni Zone described under *Cadomites arkelli* Sturani (1964), the youngest objective synonym, are *C. psilacanthus sturani* subsp. nov.

THE type specimen of '*Ammonites Humphriesianus*, Sow.' figured by d'Orbigny (1845) on plate 134, figs. 1-2 (*non* *Am. humphriesianus* Sowerby, 1825) has now been found in the Tesson Collection of the British Museum (Natural History). Tesson, mentioned by d'Orbigny (1845, p. 400) as one of the collectors of the 'species', was a teacher at the Lycee of Caen, a naturalist and friend of Professor J. A. Eudes-Deslongchamps. After his death, his fossil collections from all regions of Normandy were purchased by the British Museum (1857). Separate examinations by us in 1972-1973 of specimen No. 37309 labelled '*Ammonites (Stephanoceras) Brodioei*, J. Sow., Inferior oolite, Bajocian, Bayeux. Figd. as *Amm. Humphriesianus*, by A. d'Orbigny, Pal. Fr. Terr. jurass. Vol. I, p. 398 (1846), pl. 134, figs. 1-2' confirmed beyond doubt the identity with d'Orbigny's illustration as labelled.

Both of us had searched independently for this type specimen in the Museum National d'Histoire Naturelle, Paris, where A. d'Orbigny apparently stored most of his collections. Following the conviction of most authorities that in d'Orbigny's figures, characters of several specimens were united into one, the inability to match specimens with illustrations seemed to confirm the artistic licence of the engraver, rather than their absence from the collections. However, several specimens from the Tesson Collection have been shown beyond reasonable doubt to be the originals to A. d'Orbigny's illustrations (e.g. B.M. 37325, lectotype of *Wagnericeras wagneri* (Oppel) = *Ammonites planula* d'Orbigny, pl. 144, *non* Hehl in Zieten 1830, illustrated by Arkell 1958, text-fig. 65), and we hope that this new find of a complete specimen closely matching d'Orbigny's figures will lead to a thorough search for other type specimens.

Moreover, this is also an example of the nomenclatural confusion arising from the designation of old illustrations in old monographs as the holotype or even syntypes of new species, rather than specimens; particularly if this is done repeatedly for the same illustrations.

Family STEPHANOCERATIDAE Neumayr, 1875
 Subfamily CADOMITINAE Westermann, 1956
 Genus CADOMITES Munier-Chalmas, 1892
Cadomites psilacanthus (Wermbter, 1891)

Plate 105

- v1845 *Ammonites Humphriesianus*, Sowerby; d'Orbigny, pp. 398–400, pl. 134, figs. 1–2 [lectotype], ?3–4 [nucleus or juv.]. 1852, d'Orbigny, II(2), p. 489, fig. 430 [reproduction of d'Orbigny 1845, pl. 134, $\times 0.5$].
- *1891 *Stephanoceras psilacanthus* Behr. ms. (= *Humphriesianum* d'Orb., p.p., pl. 134, non 133); Wermbter, pp. 270–271 [citation of types only, not his specimens].
- 1895 *Coeloceras cosmopoliticum* = *Coeloceras Humphriesianum* d'Orb. (non Sow.); Möricke, pp. 20, 21 [for d'Orbigny, pl. 134, figs. 1–2]. ?1923, *Cadomites cosmopoliticum* Moericke; Fallot and Blanchet, p. 151, pl. XI, fig. 10. Non 1937, Gillet, p. 82, pl. 5, fig. 8 [fide Sturani 1966]. ?1939, Roché, pp. 200–201.
- 1964 *Cadomites* n. sp. (= '*Ammonites humphriesianus*' (non Sow.) d'Orbigny 1842–1849, t. 134, ff. 1–2; = *Cadomites cosmopoliticus* (non Möricke) Fallot and Blanchet 1923, t. 11, f. 10); Sturani (1964a), p. 37, pl. 6, fig. 6 [= *C. p. sturani* subsp. nov.].
- 1964 *Cadomites arkelli* n. sp.; Sturani (1964b), p. 20 [text-fig. 20, pl. 2, fig. 5 = *C. p. sturani* subsp. nov., holotype].
- 1966 *Cadomites psilacanthus* (Wermbter); Sturani, p. 27 [correction for Sturani 1964b; text-fig. 2 = ?*C. p. sturani* subsp. nov.].
- ?1974 *Cadomites* (*Cadomites*) *psilacanthus* (Wermbter, 1891); Kopik, p. 13, pl. 1, fig. 1a, b.

History

A. d'Orbigny (1845, pp. 398–400, pls. 133–135) described and illustrated several specimens under *Ammonites Humphriesianus* Sow. none of which belongs to the true species of J. de C. Sowerby (1825, pl. 500, fig. 1 centre; S. S. Buckman 1908, pl. VII, fig. 1a, b). In the text, d'Orbigny mixed characters now attributed to several genera and/or subgenera; according to text and plates (*excl.* pathological specimen, pl. 135, fig. 2), he distinguished (1) a serpenticone variety with subcircular whorl section (pl. 133) which became the holotype of *Stephanoceras* (*Skirroceras*) *bayleanum* (Oppel 1856–1858, p. 377), and (2) an involute inflated variety with depressed whorl section (pl. 134) which Oppel (1856–1858, p. 376) regarded as the true *Am. humphriesianus* [= *Stephanoceras* s.s.], but Wermbter (1891) separated as *S. psilacanthus*. No details on d'Orbigny's locality are available and Wermbter did not explain why he distinguished his species; in fact, Wermbter's faunal lists and field experience in the Weser Mountains, Lower Saxony, of one of us (G. E. G. W.), permit the conclusion that the German specimens were *Stephanoceras* s.s. or *S. (Stemmatoceras)*

EXPLANATION OF PLATE 105

Cadomites psilacanthus (Wermbter), lectotype; type specimen to '*Ammonites Humphriesianus*, Sowerby' of d'Orbigny (1845, plate 134, figs. 1–2). Boundary of Humphriesianum and Subfurcatum Zones, near Bayeux, Normandy. Tesson Collection No. 37309, British Museum (Natural History). 1, left side with complete peristome and damaged shell wall; 2, apertural view; 3, right side with damaged peristome, complete shell wall, and relatively retarded uncoiling of the body chamber; 4, ventral view. All figs. at $\times 0.9$.



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from the Humphriesianum and possibly also from the Sauzei Zone, i.e. generically distinct from the type specimens. However, the designated plate 134 of d'Orbigny illustrates two specimens, one (figs. 1–2) large and complete, the other (figs. 3–4) very small and septate; they are thus syntypes, although all authors quite obviously had the large complete specimen in mind which was finally designated as the lectotype by Sturani (1966).

Apparently without knowledge of Wermbter's work, W. Möricke (1895) designated the same large specimen of d'Orbigny's plate 134 as the type of *Coeloceras cosmopoliticum* (in heading p. 20 and text p. 21), this time in conjunction with Chilean stephanoceratids; even if the specimen figured by Steinmann (1881) referred to in the synonymy is taxonomically different—he did not himself describe any specimens—the case is similar to that of *C. psilacanthus*, so that Möricke's name is a junior objective synonym (cf. Sturani 1966). Because of the nomenclatural procedure, Sturani (1964a, b) considered Möricke's name a *nomen nudum* and, not knowing of Wermbter's previous naming, introduced the new (third) name, *Cadomites arkelli*, for the same figure in d'Orbigny. In correcting his error, Sturani (1966) formally designated the complete large specimen of d'Orbigny's figs. 1–2 as the lectotype. His own material, mainly from the Parkinsoni Zone of the Venetian Alps, however, differs from the designated holotype and is here distinguished at the subspecific level.

The lectotype

Specimen No. 37309 of the Tesson Collection, British Museum (Natural History), is a complete macroconch with 110 mm diameter and most of the test and aperture preserved, from the 'Inferior oolite, Bajocian, of Bayeux' (according to label).

The outer phragmocone whorls terminating at 75 mm diameter, are moderately involute and depressed subovate in section with steep umbilical wall, convex flanks (no lateral/umbilical shoulder), and a more gently convex venter. The ornament consists of sharp flexuous ribbing, with moderately spaced primaries and dense secondaries, and mid-lateral pointed to slightly elongate tubercles; the subradial primaries are adaperturally concave and very prominent; the much finer secondaries are almost four times as numerous and cross the venter with slight convexity. The umbilical seam runs along the line of tubercles. The test is complete on the phragmocone so that the septal suture is not exposed (d'Orbigny's plate 135, fig. 1 is not of this specimen). The body chamber, three-fifths whorls (225°) in length, becomes rapidly more evolute with the overlap decreasing from about two-fifths to one-third, resulting in moderate 'elliptical' coiling, and slightly contracted towards the end; there is marked negative allometry for both whorl height and breadth (see measurements). The ornament becomes increasingly prominent, particularly on the venter. The concave primaries lengthen at the end of the phragmocone and at the beginning of the body chamber, so that the tubercles move from mid-lateral outward to approximately three-fifths whorl height; but at the end of the body chamber, tuberculation is again mid-lateral. Parallel growth lines appear between the distant primaries. Slight asymmetry is present at the beginning of the body chamber with the egression of the umbilical seam being relatively retarded on the right side. Noteworthy is the strong reduction of relief on the internal mould of the left flank of the body chamber where the sharp ribbing of the shell becomes blunt.

The peristome begins with a prominent slightly prorsiradiate collar parallel to the ribs and growth lines, and continues with a smooth sinuous margin covered by growth lines which indicate a broad umbo-lateral sinus and a straight ventral lip.

Measurements in mm on ribs/tubercles

	Diameter	Whorl height	Breadth	Umbilical diameter	Primaries/whorl	Secondaries/whorl
Peristome	110.3	40	56	44	33	127
End body chamber	105.5	35.5 (0.33)	50.6 (0.47)	41 (0.38)	32	
Beginning body chamber	81.5	33 (0.40)	48.7 (0.59)	28 (0.34)		

Locality and age

The sediment in the body chamber is a grey micritic limestone with small shiny ferruginous ooids. This lithofacies is well exposed in the ancient quarry of Sully, a few kilometres north of Bayeux, at the base of the 'Oolithe ferrugineuse de Bayeux'; i.e. the boundary of the condensed Humphriesianum and Subfurcatum Zones (lower or middle/upper Bajocian) (Riout 1964, layers 3a-3b). The lectotype originated either here or in any of several other quarries of the immediate vicinity which have long been filled in.

D'Orbigny's illustration

Figs. 1 and 2 on plate 134 of d'Orbigny (1845) show good likeness to the actual specimen and are thus not synthesesograms. It appears, however, that the lithographer, J. Delarue, engraved the more complete right side (marked by relatively retarded egression of the umbilical seam) and reversed the sides in the printing process; while the aperture is from the left side. D'Orbigny's figures differ from the original also as follows: (1) 10% reduction; (2) narrower and less depressed whorl section, particularly at the beginning of the body chamber ($B/H = 1.34$ v. 1.48) which thus appears to grow isometrically rather than negatively allometric; (3) section of aperture too narrowly curved laterally; (4) less flexuous ribbing particularly at the base of the secondaries; (5) more distant primaries on the inner whorls; and (6) most tubercles pointed rather than somewhat elongate.

The paralectotypes

The original to figs. 3 and 4 of d'Orbigny's plate 134 is neither in the Tesson nor in the d'Orbigny Collections. The illustrations, said to be natural size, show a small septate specimen of 22 mm diameter which closely resembles the nucleus of the lectotype (for which the primaries were illustrated too widely spaced) and appears to be a juvenile, nucleus, or microconchiate phragmocone of the same or closely allied species. The septum is shown to have two (paired) subequal saddle axes indicating two saddles of the internal suture, typical for *Cadomites* (see Westermann 1956). The third original collection referred to by d'Orbigny (1845, p. 400) was made by Deslongchamps and kept at the University of Caen; it was destroyed by fire and bombing in 1944.

Taxonomic remarks and comparison

In spite of appreciable efforts, no topotypes of *C. psilacanthus* have been discovered. It appears that in general the genus *Cadomites* becomes more abundant only in the uppermost Bajocian, Parkinsoni Zone.

C. psilacanthus is morphologically transitional between *Stephanoceras* and *Cadomites* combining the relatively short primaries of the former with the body chamber coiling and sharpness and density of ribbing of the latter; the primaries, however, are still widely spaced as in *Stephanoceras* and the body chamber does not contract significantly as in *Cadomites*. However, the septum of the paralectotype (above) and the stratigraphic range to the top of the Bajocian indicate strong affinity to *Cadomites*. The specimens, mainly from the Parkinsoni Zone of the Alps described under *C. psilacanthus* or '*C. arkelli*' by Sturani (1964a, b, 1966) are here distinguished as a new subspecies of *C. psilacanthus*.

The Andean '*Coeloceras cosmopoliticum*' Möricke (1895) from northern Chile has been illustrated only in a single specimen by Steinmann (1881, p. 268, pl. XII, fig. 7). It has the curved primaries and round tubercles of *C. psilacanthus* but differs in the circular whorl section and the more distant primaries on the inner whorls. Current reinvestigation by one of us (G. E. G. W.) of the Caracoles fauna suggests closer affiliation to *Stephanoceras* s.s. than to *Cadomites*. There is close resemblance to *C. deslongchampsii* (Defrance in d'Orbigny, *nom. corr.*) from the Parkinsoni and Zigzag Zones and the closely allied *C. homalogaster* Buckman (1925, pl. 543) from the 'Leptosphinctes hemera' (= Subfurcatum Zone), except for the shorter primaries and the absence of a lateral shoulder in *C. psilacanthus*. The somewhat similar probable *Cadomites* described by Roché (1939, pls. 2 and 3) from the Humphriesianum-Subfurcatum Zones of eastern France (*C. humphriesiformis*, *C. perplicatus*, *C. ? lissajousi*) are all much more compressed than *C. psilacanthus*.

Cadomites psilacanthus sturanii subsp. nov.

(Synonymy see under *C. psilacanthus*.)

Diagnosis. More rounded (narrower) whorls and less flexed ribs than in *C. psilacanthus* s.s.

Holotype. *Cadomites arkelli* Sturani, 1964b, p. 20, text-fig. 20, pl. 2, fig. 5, from the Parkinsoni Zone of Cava Magnavacca, Venetian Alps (for nomenclature of *C. arkelli* see above).

Age. This subspecies occurs at a higher level in the upper Bajocian (Parkinsoni Zone) than *C. psilacanthus* s.s.

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REFERENCES

- ARKELL, W. J. 1951-1958. Monograph of English Bathonian ammonites, parts 1-8. *Palaeontogr. Soc. [Monogr.]*, 1-264, 33 pls.
- BUCKMAN, S. S. 1908. Illustrations of type specimens of the Inferior Oolite ammonites in the Sowerby collection. *Ibid.* pls. I-VII with explanations.
- 1909-1930. (*Yorkshire*) *Type ammonites*, parts 1-7. London, text and 790 pls.
- FALLOT, P. and BLANCHET, F. 1923. Observations sur la faune des terrains jurassiques dans la region de Cardo et de Tortosa (Province de Tarragone). *Treb. Inst. Catal. Hist. nat.* 1921-1922, 71-260, 13 pls.

- GILLET, S. 1937. Les ammonites du Bajocien d'Alsace et de Lorraine. *Serv. Carte géol. Alsace-Lorraine, Mem.* **5**, 130 pp., 5 pls.
- KOPIK, J. 1974. Genus *Cadomites* Munier-Chalmas, 1892 (Ammonitina) in the Upper Bajocian and Bathonian of the Cracow-Wielun Jurassic Range and the Gory Swietokrzyskie Mountains (southern Poland). *Inst. Geol., Bull.* **276**, 7-53, pls. I-XI.
- MÖRCKE, W. 1895. Beiträge zur Geologie und Palaeontologie von Südamerika. II, Die Versteinerungen des Lias und Unteroolith von Chile. *Neues Jb. Miner. Geol. Paläont. Beil.-Bd.* **9**, 1-100, pls. I-VI.
- MUNIER-CHALMAS, E. C. P. A. 1892. Sur la possibilité d'admettre un dimorphisme sexuel chez les Ammonitidés. *C.r. Soc. géol. Fr. ser. 3*, **20**, 170-174.
- NEUMAYR, M. 1875. Die Ammoniten der Kreide und die Systematik der Ammonitiden. *Z. dt. geol. Ges.* **27**, 854-892.
- OPPEL, A. 1856-1858. Die Juraformation Englands, Frankreichs und des südwestlichen Deutschlands. *Jh. Ver. vaterl. Naturk. Württ.* **XII**, 221-556; **XIII**, 141-396; **XIV**, 129-291.
- ORBIGNY, A. D'. 1842-1849. *Paléontologie Française, Terrains jurassiques, Céphalopodes*. Paris (Masson), text 1-642, Atlas pls. 1-234.
- 1850-1852. *Cours élémentaire de paléontologie et de géologie stratigraphique*. V. Masson ed., Paris, 1-847, 628 figs.
- RIOULT, M. 1964. Le stratotype du Bajocien. In *Coll. Jurass. Luxembourg 1962, Compt. Rend. Mem. Inst. grand-ducal, sect. sci. nat. phys. math.* Luxembourg, 239-263.
- ROCHÉ, P. 1939. Aalénien et Bajocien du Maconnais et de quelques régions voisines. *Trav. Lab. Géol. Univ. Lyon*, **35**, Mém. **29**, 1-355, pls. I-XIII.
- SOWERBY, J. DE C. 1822-1846. *Mineral Conchology*. Pls. 338-648.
- STEINMANN, G. 1881. Zur Kenntniss der Jura- und Kreideformation von Caracoles (Bolivia). *Neues Jb. Miner. Geol. Paläont. Beil.-Bd.* **1**, 239-301, pls. I-XVII.
- STURANI, C. 1964a. La successione delle faune ad ammoniti nelle formazioni mediogiurassiche delle Prealpi Veneto occidentale (regioni tra il Lago di Garda e la valle del Brenta). *Ist. Geol. Miner. Univ. Padova, Mem.* **24**, 1-64, pls. I-VI.
- 1964b. Ammoniti mediogiurassiche del Veneto, faune del Baiociano terminale (Zone a Garantiana e a Parkinsoni). *Ibid.* 1-43, pls. I-IV.
- 1966. Ammonites and stratigraphy of the Bathonian in the Digne-Barreme area. *Boll. Soc. paleont. ital.* **5**, 3-57, pls. 1-24.
- WERMBTER, H. 1891. Der Gebirgsbau des Leinethales zwischen Greene und Banteln. *Neues Jb. Miner. Geol. Paläont. Beil.-Bd.* **7**, 246-294, pls. IV-V.
- WESTERMANN, G. E. G. 1956. Phylogenie der Stephanocerataceae und Perisphinctaceae des Dogger. *Neues Jb. Geol. Paläont. Abh.* **103**, 233-279.
- ZIETEN, C. H. V. 1830-1834. *Die Versteinerungen Württembergs*, parts 1-12, 102 pp., 72 pls. Stuttgart.

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